

THE VALUE OF NON-STRESS AND STRESS TESTS IN ANTEPARTUM FOETAL MONITORING†

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Introduction

Few questions are more perplexing in the antepartum management of high-risk pregnancy than that of when to intervene for foetal reasons, or whether to intervene at all. During the antepartum period, investigations utilizing the response of the foetal heart rate to uterine contractions occurring either spontaneously or with oxytocin stimulation have given some indication of utero-placental respiratory reserve.

Uterine contractions interfere with and decrease the intervillous space blood flow, and therefore diminish O₂ transfer from the mother to the foetus. The contraction stress test (CST) is now a proven useful test for the antepartum evaluation of utero-placental respiratory function. An intravenous oxytocin infusion is begun at a rate of 0.25 mu/mn.

then doubled every 15-20 minutes until an adequate uterine contraction frequency of 3 in 10 minutes is established. Persistent late foetal cardiac deceleration indicates a positive CST (Fig. 1), whilst absence of the same reveals a negative CST (Fig. 2). However, the CST is time-consuming, a single test may well last for 3-4 hours. An attractive alternate approach of antepartum foetal heart

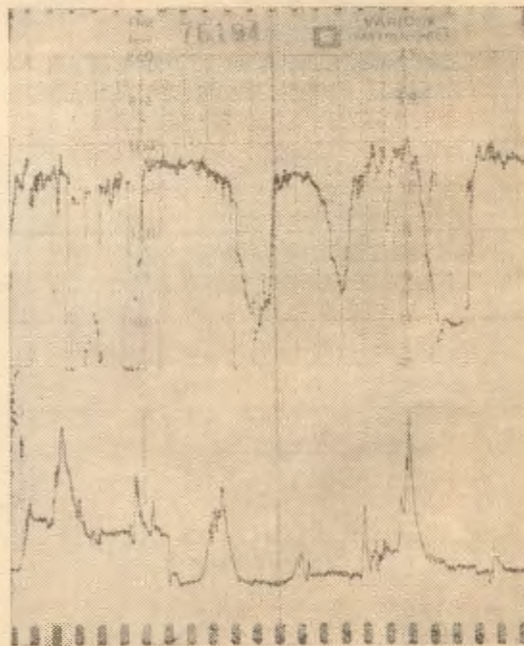


Fig. 1

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rate testing is the non-stress test (NST) which seeks foetal cardiac acceleration with foetal movements. Foetal cardiac acceleration of at least 15 beats per minute, lasting for over 15 seconds with

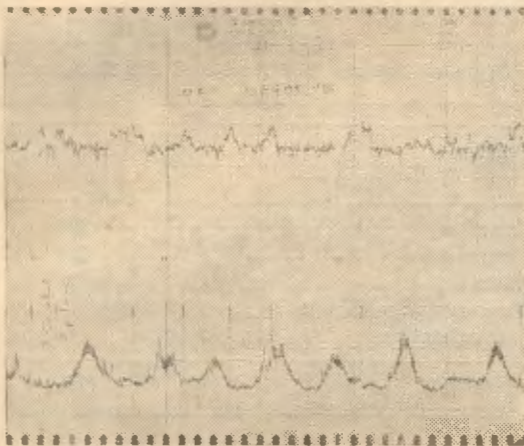


Fig. 2

foetal movements reveals a reactive pattern (Fig. 3) and suggest foetal well-being. Absence of foetal cardiac acceleration as described above, reveals a non-reactive pattern (Fig. 4) suggesting a foetal compromise. This demands a CST for further evaluation.

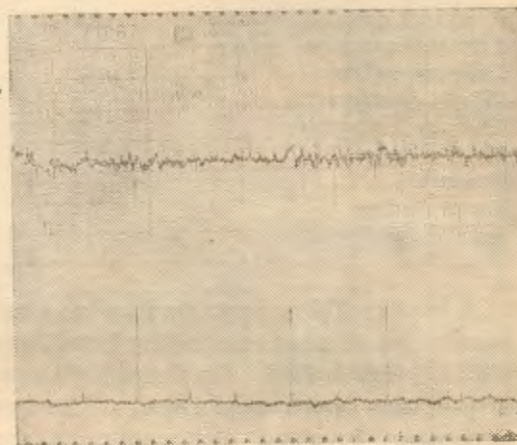


Fig. 4

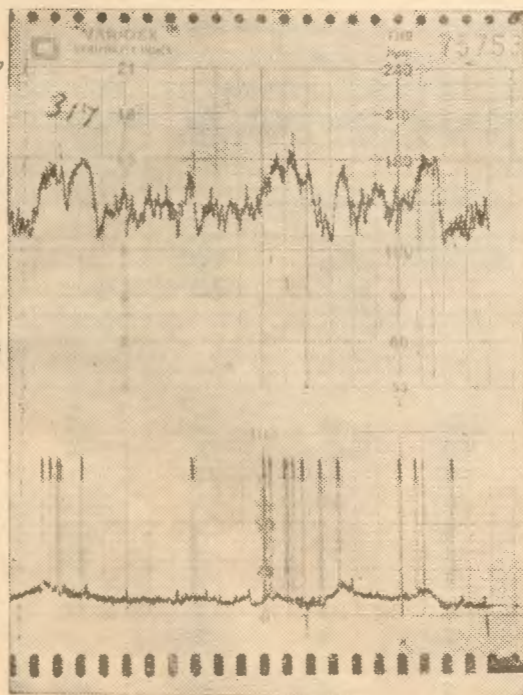


Fig. 3

Material and Methods

Clinical experience employing antepartum foetal heart rate monitoring at the Nowrosjee Wadia Maternity Hospital, Parel, began in June 1979. A Corometrics Foetal Monitor 112 was used with a paper speed of 1 cm/min. Foetal heart rate was recorded externally by an ultrasound array transducer and uterine/foetal activity by the external tocotransducer and an event marker.

Patients were referred for testing from the outpatient clinic, the inpatient antepartum ward and from private consultants throughout the city. Indications for APFHRM are given in Table 1. Testing was generally started at a gestational age of 34 weeks. Non-stress test was tried as the primary approach, the CST being resorted to only when indicated.

TABLE I
Indications of Antepartum Electronic Foetal
Heart Rate Monitoring

| Indications | NST | OCT |
|---------------------------------|-----|-----|
| Intrauterine growth retardation | 240 | 4 |
| Bad obstetric history | 222 | 4 |
| Toxaemia of pregnancy | 207 | 4 |
| Postdatism | 164 | 18 |
| Decreased foetal movements | 101 | 1 |
| Previous caesarean section | 57 | 0 |
| Diabetes mellitus | 28 | 0 |
| Elderly primigravida | 13 | 0 |
| Prolonged infertility | 13 | 0 |
| Heart disease | 11 | 2 |
| Anaemia | 7 | 0 |
| Foetal distress | 6 | 0 |
| Renal hypertension | 1 | 0 |

A total of 575 patients underwent antepartum foetal heart rate testing from June 1979 till March 1981. On these, 1070 non-stress tests were performed. The test procedure involved observation of the foetal heart rate baseline and its acceleration with foetal movements. The test time ranged from 10-30 minutes, the average being 20 minutes. Only 33 required a CST.

Results

Table II reveals the breakdown of these cases, depending on the types of pattern obtained. The interpretation is shown in Table II.

TABLE II
Type of Pattern Obtained and the Number of Tests

| Pattern | No. of tests |
|------------------------------------|--------------|
| Reactive | 826 |
| Nonreactive | 225 |
| Silent | 13 |
| Nonreactive with late deceleration | 6 |
| Total | 1070 |

Table III depicts the breakdown of indications and the pattern.

Table IV shows the breakdown of the indications in relation to the results.

It is noted that although the incidence of abdominal delivery was definitely higher in those with the non-reactive

TABLE III
Type of Pattern Obtained in the Various Indications

| Indications | Total | Reactive | Non-reactive | OCT negative | OCT positive |
|---------------------------------|-------|----------|--------------|--------------|--------------|
| Intrauterine growth retardation | 240 | 180 | 60 | 4 | 0 |
| Bad obstetric history | 222 | 178 | 44 | 2 | 2 |
| Toxaemia of pregnancy | 207 | 166 | 41 | 1 | 3 |
| Postdatism | 164 | 109 | 55 | 12 | 6 |
| Diminished foetal movements | 101 | 90 | 11 | 1 | 0 |
| Previous caesarean section | 57 | 50 | 7 | 0 | 0 |
| Diabetes mellitus | 28 | 18 | 10 | 0 | 0 |
| Elderly primigravida | 13 | 10 | 3 | 0 | 0 |
| Prolonged infertility | 13 | 8 | 5 | 2 | 0 |
| Heart disease | 11 | 7 | 4 | 0 | 0 |
| Anaemia | 7 | 4 | 3 | 0 | 0 |
| Foetal distress | 6 | 6 | 0 | 0 | 0 |
| Renal hypertension | 1 | 0 | 1 | 0 | 0 |

TABLE IV
Outcome of Labour and Correlation With the Type of Pattern Obtained

| Type of pattern | Normal vaginal delivery | Forceps | Lower segment caesarean section |
|-----------------|-------------------------|---------|---------------------------------|
| Reactive | 416 | 17 | 10 |
| Nonreactive | 106 | 10 | 16 |
| Negative CST | 20 | 2 | 0 |
| Positive CST | 0 | 0 | 11 |

pattern and positive CST, the foetal outcome was good. It is in this group that antepartum foetal heart rate monitoring proves to be a real saviour as otherwise many of these would have ended as unexplained foetal deaths.

Table V shows the correlation of the pattern with Apgar Score.

TABLE V
Correlation Between Type of Pattern Obtained and Apgar Score

| Type of pattern | Apgar score | |
|---------------------|-------------|-------------|
| | More than 8 | Less than 8 |
| Reactive pattern | 400 | 43 |
| Nonreactive pattern | 116 | 16 |
| Negative CST | 18 | 2 |
| Positive CST | 8 | 3 |

In the same time period a total of 300

high-risk patients were managed, without the benefit of antepartum foetal heart rate monitoring with a perinatal loss of 15, giving the perinatal mortality of 50/1000, whereas in the group with antepartum foetal heart rate monitoring, the perinatal loss was 7 in 575 patients or 13/1000.

Conclusion

The antepartum use of the cardiotocometer by the non-stress and stress tests has helped to pick up certain unrecognized pregnancy abnormalities, and has enabled us to reduce the perinatal mortality considerably. Both the non-stress tests and the contraction stress tests have immense value in the timely prediction of the nature and gravity of foetal jeopardy, and will result in infants of better intellectual potential. This will eventually help us to a better generation.